

01-719

REMARKS

Claims 1-20 are in the case and claims 7-20 have been withdrawn from consideration. The specification is objected to. Claims 1-2, 4, and 6 are rejected under 35 USC § 102 over USPN 6,692,894 to Nakano et al. Claims 3 and 5 are rejected under 35 USC § 103 over Nakano et al. in view of USPN 5,592,325 to Dodge et al. Claim 1 and the specification have been amended. No new matter is presented by the amendments, which are supported by the disclosure of the original specification and drawings. Reconsideration and allowance of the claims are respectfully requested.

OBJECTION TO SPECIFICATION

The specification is objected to for referencing figure 7 twice, and figure 9 not at all, in the section for the brief description of the figures. Applicants have amended this section so as to correct the typographical error. Reconsideration and removal of the objection are respectfully requested.

CLAIM REJECTIONS UNDER §102

Claims 1-2 and 6 are rejected under 35 U.S.C. 102 as being unpatentable over Nakano et al. It is assumed that claim 4 is also rejected under 35 U.S.C. 102 as being unpatentable over Nakano et al., as claim 4 is not otherwise mentioned in the office action. Nakano et al. do not describe the phase shift mask as recited in these claims.

First, the technology described by Nakano et al. is very different from the technology presently claimed, even though both are applicable to the photolithographic processes of forming integrated circuits. The present claims are directed toward a mask structure – more specifically a phase shift mask – which is used to form the images that are transferred to the wafer on which the integrated circuits are formed. Nakano et al., on the other hand, describe a photoresist stack that is used without a mask, or in other words, a technique where the images of the integrated circuits are formed on the wafer by a direct writing process, and no mask is used at all. Thus, the present claims are directed toward a mask, and Nakano et al. describe a system where no mask is needed.

01-719

Nakano et al. describe the difference between these two disparate technologies in the background section of their patent. Nakano et al. describe the general field of technology in which the present claims are applicable by stating that "the photolithographic patterning process *currently* undertaken is conducted by exposing a photosensitive resist layer formed on a substrate with active rays through a pattern-bearing *photomask* to form a latent image of the pattern which is then developed by using a developer solution. A factor limiting the minimum dimension of the thus formed resist pattern is *diffraction* of the light ..." (emphasis added, column 1, lines 24-30). The present invention as claimed is directed toward exactly that problem as mentioned by Nakano et al., that being the diffraction of the light that passes through the mask.

By contrast, Nakano et al. describe their technology as being completely different from that described above, where they state that "on the other hand, an alternative approach to this problem is now receiving attention for accomplishing photolithographic patterning of a photoresist layer with fineness not attained by the conventional methods utilizing a near-field light which is inherently free from the limitation of light diffraction" (column 1, lines 55-60). Thus, Nakano et al. propose a technique where the problems of light diffraction through a mask, which the present invention helps resolve, is avoided altogether.

Now that the differences between the two technologies have been described, the differences between the disclosure of Nakano et al. and the claims can be more readily understood, as described below.

Independent claim 1 claims, *inter alia*, a phase shift mask including a mask substrate that is substantially transparent to the incident light beam, and a patterned first phase shift layer having a refractive index that is nonlinear with the intensity of the incident light beam, wherein the refractive index of the first phase shift layer changes with the intensity of the incident light beam on the phase shift mask. Nakano et al. do not describe this structure. Specifically, Nakano et al. do not describe a mask substrate at all, but instead describe an integrated circuit substrate on which the integrated circuits are formed.

Although applicants believe that this is sufficient for the present invention as claimed to patentably define over the cited references, applicants have amended claim 1

01-719

to recite that the first phase shift layer is patterned, as depicted in the figures, to further highlight the differences between the present technology as claimed and the technology of Nakano et al. The layers described by Nakano et al. are not patterned prior to their use, and do not need to be, because a direct writing process is used to expose them.

Thus, claim 1 patentably defines over Nakano et al. Reconsideration and allowance of claim 1 are respectfully requested. Dependent claims 2, 4, and 6 depend from independent claim 1, and contain additional important aspects of the invention. Therefore, dependent claims 2, 4, and 6 patentably define over Nakano et al. Reconsideration and allowance of dependent claims 2, 4, and 6 are respectfully requested.

CLAIM REJECTIONS UNDER §103

Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakano et al. in view of Dodge et al. Dependent claims 3 and 5 depend from independent claim 1, which claims *inter alia*, a phase shift mask including a mask substrate that is substantially transparent to the incident light beam, and a patterned first phase shift layer having a refractive index that is nonlinear with the intensity of the incident light beam, wherein the refractive index of the first phase shift layer changes with the intensity of the incident light beam on the phase shift mask. The combination of Nakano et al. and Dodge et al. do not describe such a phase shift mask.

The deficiencies of Nakano et al. in regard to this combination of limitations are described at length above. Dodge et al. do not compensate for the deficiencies of Nakano et al., in that Dodge et al. do not describe the use of a layer having a refractive index that is nonlinear with the intensity of the incident light beam. Rather, Dodge et al. describe that KTP is a nonlinear *frequency* converting compound. Further, there is no discussion in Dodge et al. of modifying a refractive index of KTP or any other material by adjusting the intensity of the incident light. Further, Dodge et al. describe forming a mask, as presently claimed. Thus, the combination of Dodge et al. and Nakano et al. *might* teach that the near field photolithographic layers of Nakano et al. could be formed with KTP, but do not in any way suggest that a phase shift mask could be formed with KTP, as neither Nakano et al. nor Dodge et al. describe such a mask. Thus, there is no incentive

01-719

to modify the layers of Nakano et al. to produce the mask of the present invention as claimed.

Thus, claims 3 and 5 patentably define over Nakano et al. in view of Dodge et al. Reconsideration and allowance of claims 3 and 5 are respectfully requested.

CONCLUSION

Applicants assert that the claims of the present application patentably define over the prior art made of record and not relied upon for the same reasons as given above. Applicants respectfully submit that a full and complete response to the office action is provided herein, and that the application is now fully in condition for allowance. Action in accordance therewith is respectfully requested.

In the event this response is not timely filed, applicants hereby petition for the appropriate extension of time and request that the fee for the extension be charged to deposit account 12-2355. If other fees are required by this amendment, such as fees for additional claims, such fees may be charged to deposit account 12-2252. Should the examiner require further clarification of the invention, it is requested that she contact the undersigned before issuing the next office action.

Sincerely,

LUEDEKA, NEELY & GRAHAM, P.C.

By: 

Rick Barnes, 39,596

2004.07.02